

WHAT IS CLAIMED IS:

1. A method for forming an oxide layer comprising:

5 (a) applying a coating material to a substrate;

(b) heating said first layer to a first process temperature for a first time duration to form a first processed layer; and

(c) heating said first processed layer to a second process temperature for a second time duration to form a second processed layer.

10 2. The method of Claim 1, further comprising:

applying a second layer of said coating material over said second processed layer;

15 heating said second layer of said coating material to said first process temperature for said first time duration to form a third processed layer; and

heating said third processed layer to said second process temperature for said second time duration to form a fourth processed layer.

20 3. The method of Claim 1, wherein said thickness of said second processed layer is between about 1,000 Å and 1 µm.

4. The method of Claim 1, wherein said first time duration is between about five minutes to about ten minutes; and

25 wherein said second time duration is between about five minutes to about ten minutes.

5. The method of Claim 1, wherein said first process temperature is between about 200° C and about 400° C.

30 6. The method of Claim 1, wherein said second process temperature is up to about 1300° C.

7. The method of Claim 1, wherein said coating material comprises spin-on glass (SOG).

8. The method of Claim 7, wherein said heating to said first process temperature causes said SOG to outgas to form a layer of SiO₂; and wherein said second process temperature causes said layer of SiO₂ to cure.

9. The method of Claim 7, wherein said applying a coating material comprises applying a layer of spin-on glass to a substrate.

10. The method of Claim 1, wherein said substrate comprises a quartz substrate.

11. The method of Claim 1, further comprising repeating (a), (b), and (c) until an oxide layer of a pre-selected thickness is formed.

12. A method for forming an oxide layer on a substrate comprising:
(a) applying a first layer of a spin-on glass ("SOG") to a substrate;
(b) heating said first layer to a first process temperature for a first time duration to cause said first layer of SOG to outgas to form a layer of SiO₂; and
(c) heating said layer of SiO₂ to a second process temperature for a second time duration to cause said SiO₂ layer to harden.

13. The method of Claim 12, further comprising:
applying a second layer of SOG over said layer of SiO₂;
heating said second layer of SOG to said first process temperature for said first time duration; and
heating said second layer of SOG to said second process temperature for said second time duration.

14. The method of Claim 12, wherein said thickness of said SiO₂ layer is between about 1,000 Å and 1 μm.

15. The method of Claim 12, wherein said first time duration is between about five minutes to about ten minutes; and

wherein said second time duration is between about five minutes to about ten minutes.

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16. The method of Claim 12, wherein said first process temperature is between about 200° C and about 400° C.

10 17. The method of Claim 12, wherein said second process temperature is up to about 1300° C.

18. The method of Claim 12, wherein said substrate comprises a quartz substrate.

15 19. The method of Claim 12, wherein said applying a first layer of SOG to a substrate comprises dipping said substrate in a bath of said SOG.

20 20. The method of Claim 12, further comprising repeating (a), (b), and (c) until an SiO₂ layer of a pre-selected thickness is formed.

21. An apparatus for forming an oxide film on a semi-conductor substrate comprising:

means for applying a first layer of a spin-on glass ("SOG") to a substrate;

25 means for heating said first layer to a first process temperature for a first time duration to cause said first layer of SOG to outgas to form a layer of SiO₂; and

means for heating said SiO₂ layer to a second process temperature for a second time duration to cause said SiO₂ layer to harden.

30 22. An apparatus for forming an oxide film on a substrate comprising:
a processing chamber defining a cavity configured to receive a substrate; and
a burner assembly disposed in said cavity configured to provide a plurality of flames fueled by process gases emanating from a first surface of said burner assembly, said flames directed perpendicular to said substrate.

23. The apparatus of Claim 22, wherein said substrate comprises a silicon wafer.

5 24. The apparatus of Claim 22, wherein said burner assembly comprises a plurality of nozzles configured in an array on said first surface of said burner assembly.

25. The apparatus of Claim 22 wherein said process gases comprise a mixture of H_2 and O_2 .

10 26. The apparatus of Claim 22, wherein said burner assembly comprises a first plurality of nozzles and a second plurality of nozzles, wherein a first process gas emanates from said first plurality of nozzles and a second process gas emanates from said second plurality of nozzles.

15 27. The apparatus of Claim 26, wherein said first process gas comprises H_2 and said second process gas comprises O_2 .

20 28. An method for forming an oxide film on a substrate comprising:
providing a substrate; and
heating said substrate using a plurality of process flames fueled with H_2 and O_2 and directed perpendicular to a first surface of said substrate, said plurality of process flames causing a formation of H_2O vapor and oxygen radicals, said H_2O vapor and said oxygen radicals used alone or in combination as reactant to form an oxidation layer on a
25 first surface of said substrate.

30 29. The method of Claim 28, wherein said heating is accomplished using a burner assembly, said plurality of process flames emanating from a first surface of said burner assembly.

30. The method of Claim 29, wherein said burner assembly comprises an array of nozzles, wherein said H_2 and O_2 emanate from each of said nozzles.

31. The method of Claim 29, wherein said burner assembly comprises a first plurality of nozzles from which said H_2 is provided and a second plurality of nozzles from which said O_2 is provided.